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Mediterranean Conference on Information Systems (MCIS)

10-2008

TOWARDS A BETTER ARTICULATION BETWEEN CREATIVITY, INNOVATION AND ICTS: THE CASE OF AN ENVIRONMENTAL SCANNING CSCW PROJECT FOR A TUNISIAN ADMINISTRATION CONTEXT

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Abstract:

Public administrations have long been criticized for their bureaucratic and pyramidal model which could justify their inaction, partitioning and their rigid functional mode toward their environment. The advent of ICTs precipitated by the Information Economy triggered a boost within these organizations to openness, flexibility and revising their methodology of work. Tunisian Administration has not escaped this trend, the case mentioned in this article illustrates this desire to mobilize the intellectual capital available within its structures and those of its partners. A collaborative platform project's implementation is initiated as Computer supported Collaborative Work (CSCW) to structure Environmental scanning activity. The implicit idea behind is that technology will act as "button press" to run the system without calling into question the existing one. But sensemaking triggered by uncertainty and ambiguity of environmental information is essentially a creative process that could generate knowledge only under favourable structuring conditions and culture. Given the complexity of such human intelligence based system, and the importance of organizational and structural dimensions of the solution, a repository of diagnosis was deemed necessary to identify obstacles that might emerge especially at the baiting phase. Our contribution through this article is at two levels: the definition of a conceptual framework integrating ES and CSCW for better links between creativity and innovation and the proposal of a repository of diagnosis for practitioners. Our aim is to propose at the end of this ongoing longitudinal study recommendations for consulting teams intervening within Tunisian administration context in the field of information system mainly Environmental Scanning System (ESS).These recommendations are intended to draw their attention to the impact of the neglect of organizational and structural dimensions and to help design the systems' specifications to ensure a good articulation between creativity and innovation.

Keywords: Environmental scanning, CSCW, creativity, innovation, Tunisian administration.

INTRODUCTION

In the field of information systems, innovation projects tend to invest in ICTs and to neglect the organizational dimension and the role of stakeholders in the process of creativity that appears to be the condition of local innovation. The specifications of the IS projects include administrative, financial and technical clauses with a training component to the tool but rarely clauses related to the portfolio of skills and to the contextual conditions necessary to foster creativity and innovation. This lack of specifications is felt most acutely in the context of strategic information systems (S-IS) characterized by their high complexity. This type of system is supposed to provide a competitive advantage to the structure which houses them. It may even extend beyond the borders of this structure because strategic information is largely original, external, and by nature much less available than internal information. For that purpose, Computer Supported Collaborative Work (CSCW) including strategic scanning tools has evolved so as to federate expertise through the sharing of knowledge and know-how of people from different areas of training and services. These tools are now perceived as vectors of change: organizational changes, cultural change, changes in working methods and techniques used. But the collaborative tool as a distributed process of co-evolution is often complex and could face obstacles and resistance that might be crippling for creativity and innovation. The situation is more complicated within public administrations which have long been criticized for their bureaucratic (Crozier, 1963) and pyramidal (Mintzberg, 1990) model which could justify their inaction, partitioning and their rigid functional mode toward their environment. The advent of ICTs precipitated by the Information Economy triggered a boost within these organizations to openness, flexibility and revising their methodology of work. Coté, (2005) hold that the strategic monitoring has played an important role in this organizational metamorphosis. Tunisian administration, since it's insertion within the European space, took part to this movement. A decision of enlarging the agriculture observatory to interprofessional agriculture organisms and to insert them within a collaborative ESS has been taken since 2005. A consortium of consultants has been selected for the device implementation, but the first contacts where somewhat difficult and the consultant team apprehended the emergence of certain obstacles that could be crippling for the project.

What kind of barriers could face a consultant team when implementing a collaborative Environmental Scanning System within a Tunisian administration context?

To bring answers to this question and make propositions for a better articulation between creativity, innovation and mediated communication, we had to take part to the project as observatory researcher. Our intervention needed a diagnosis repository to guide our observations. In the first part of this article we present the conceptual framework of the environmental scanning CSCW, the mediating role of ICTs and the model derived from the literature review. In the second part, we try to identify within prior studies in the fields of ES, organizational communication and CSCW, the potential structural and/or cultural obstacles a consulting team could face when implementing the ES system. In the third part we describe the research project and the approach used to introduce change at the starting phase.

1. THE CONCEPTUAL FRAMEWORK

1.1 Environmental Scanning as human networked System

The most definition of Environmental Scanning has been derived from the earlier work of Aguilar (1967). He used this concept to describe "the acquisition and use of information about events and trends in an organisational external environment, the knowledge of which would assist management in planning the organization future course of action". More recent models of ES (Choo 2002, Lesca 2003) brought the notion of sensemaking from. Weick's (1995) to define the process by which an organisation makes sense of the current events tracked in its external environment and capitalizes its potential of experience to reduce uncertainty and ambiguity and support the decision making process. More recently, K.S Albright (2004) introduced the notion of communication in his definition and outlined the methodological aspect of the process as an artefact which evokes the structuring dimension: "Environmental scanning is the internal communication of external information about issues that may potentially influence an organization's decision-making process (...)In essence, environmental scanning is a method for identifying, collecting, and translating information about external influences into useful plans and decisions." Internal communication is needed to link "*People* working together to achieve individual or collective goals*."* It can be defined as *"*the transfer of meanings between persons and groups" (Miller, 2006). Sensemaking as social learning process unfolds within organizational or interorganizational networked structures. Human action through the learning process could be, according to Hutchin (1995), guided by technology as social artefact triggering change and ability to create, transform and propagate new representations. To use Hutchin's vocabulary, artefacts as repository of knowledge constructed in durable form becomes tools when they are used to create transform or propagate representations (Groleau, 2002). The sensemaking creative process and knowledge generating innovative outputs are collective representations of the world which need such repositories of knowledge. Giddens' structuration theory incited many authors to study the role of technology in production and reproduction of social practices. In a more finalized view, Suchman (1987) was critical of the rationalist approach adopted by most computer designers which maintains that action unfolds according to a plan. For her, action is 'situated', it is an emerging process that adapt to the contingencies of the context as a set of structures. "Suchman's work has been very influential and became one of the founding approaches of CSCW movement" (Groleau, 2002).

1.2 The mediating role of CSCW

As mentioned by S. Hanumantharao (2003) "CSWC (Computer Supported Collaborative Work) sometimes also referred to as Groupware, is the third major research area in group support system where, as with the other areas, there is a lot of debate on the definition and description. For example, the very name is being debated and many authors preferring the second 'c' in CWSC to denote either Collaboration or Collective or Coordinated." Some of the acceptable descriptions of CSCW could be *"(it) refers to people working together on a product, research area, topic or scholarly endeavour with help from computers*" (Palmer & Fields, 1994). This definition, as S. Hanumantharao (2003) thinks, is broad but specific enough to include in its scope the fields of:

- CMC (Computer Mediated Communication) systems which "*use a communication network to compose, store, deliver and process communication. CMC systems focus predominantly on the communication aspects of group decision process. They aim to reduce barriers to communication and promote efficient and effective communication as means of achieving better decision, higher productivity and satisfaction with the group process.*" Hiltz and Tutoff (1985)
- GDSS (Group Decision Support System, defined by De Sanctis and Gallupe (1987) as systems that "*aim to improve the process of group decision making by removing communication barriers, providing techniques for structuring decision analyses and systematically Directing the pattern, timing or context of decision*." This definition based on the perspective of "Information Exchange View" of group decision process is broad enough to integrate CMC systems also.

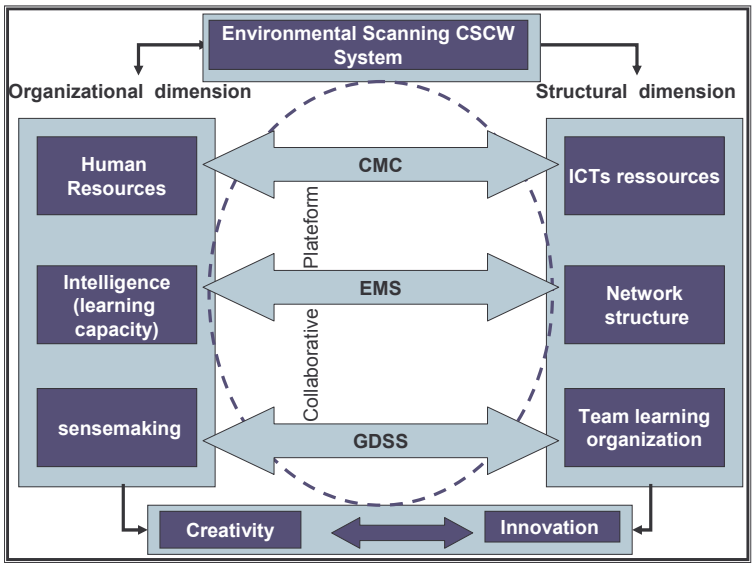
- EMS. (Electronic Meeting Systems) which is a combination of GDSS and CMC proposed by Nunamaker and al. (1991). "*a form of meeting environment that strives to make group meetings more productive using information technology*". They include support for dispersed meeting and thus seem to be well suited to decentralized organizations.

Collaborative Working Environment (CWE) which supports people (e.g., e-professionals[1]) in their individual and cooperative work offer Collaborative workspace, Document Management and Wiki[2] group to enable a common understanding within a group or community. For the purposes of this study, as defined above, ESS (Environmental Scanning System) mainly based on human local and distributed networks, integrates tasks which require computer tools support to structure and facilitate each phase of the process : monitoring the environment needs both intelligent human radars and intelligent web engines, information processing (sensemaking and knowledge generating) Knowledge storing and disseminating. The mediating role of ICTs has been advanced by many authors to demonstrate their ability to facilitate communication between two or more individuals or groups. Within a network structure characterized by Collaborative/ Cooperative/Collective work, a combined technical solution integrating CMC (Computer Mediated Communication), GDSS (Group Su ort Decision System) and EMS (Electronic Mediated System) functionalities could be a well suited CSCW solution for ES/KM projects. An emerging category of computer software, collaboration platforms proposes unified electronic platforms that support synchronous and asynchronous communication through a variety of devices and channels. Certain platforms brought together features of CMC, GDSS and EMC to create tools and methods to help individuals and groups to efficiently share diverse and conflicting knowledge. Certain platforms integrate a module of project management which can be used to structure the implementation phase of the ES project and establish communication between ES staff and consultant team. If the technology were able to structure and solve the problems of monitoring, storage and flow of information, creativity, knowledge generation and expertise managers need to reduce the uncertainty surrounding the decision-making act remains highly human. Authors who touched ES in its organizational dimension (Jain, 1984; Choo, 2002) did not hesitate to say that this is not a science but an art. Feeling, insight, and sensitiveness are the most important and scarce features of a human radar. The figure below describes our model of an Integrated Environmental Scanning CSCW System:

Figure 1: The Integrated Environmental Scanning CSCW System model

[1] **E-professional** or "eprofessional" or even "eProfessional" is a term used in Europe to describe a professional whose work relies on concepts of telework or telecommuting: working at a distance using information and communications technology, as well as online Collaboration (i.e. Virtual_team, Mass_collaboration, Massively_distributed_collaboration[1]), online community_of_practice such as the Open_source community, and Open_innovation principles.

[2] Wikis are often used to create collaborative websites and to power community websites. Wikis are used in business to provide intranets and Knowledge Management Systems.



2. THE POTENTIAL OBSTACLES TO CREATIVITY AND INNOVATION

2.1 Potential obstacles related to structure

2.1.1 The kind of organization structure proposed

Organization structure is defined by Gibbons and Prescott, (1996) as "*the features of an organization that serve to control or distinguish its parts. The three dimensions that are commonly used to measure differences in structure are: formulisation, centralization and flexibility. These patterns in structuring should depend on the organizational culture of the social context."* The context is defined by Hutchin (1995) as a set of structures, of materials or social origin from which individuals draw the information necessary to undertake action. According to Argyris, C (1976; 1985) action allows knowledge creation through conversion of explicit knowledge into tacit knowledge (learning) and through experimentation (sensemaking). These processes can emerge only within team-based where "*Employees become "knowledge workers"*[3] *dedicated to self- improvement, positive results and productive collaboration"* (Eisenberg and Goodall Jr, 2003). The authors exclude committees, task forces and ad hoc groups with high degree of flexibility and low degree of control, which doesn't challenge the existing classic structures, from the three recognized categories of teams: project teams, work teams and quality-improvement teams.

We'll be attentive during our diagnosis to the kind of structure proposed for our ESS project and to verify if the organizational culture and social context where taken in account.

2.1.2 The structuring effect of technology

The structuring effect of technology and its capacity to induce cultural change has been outlined by Ansoff (1975). According to the author, "in the application of this technology a typical "chicken and egg" problem arises: should strategic decisiveness be built up first or should the new system be introduced?" Ansoff has noticed that "in the most cases it is possible to join the two change process in a single program of organizational transformation in which the new system and the new problem

[3]Peter Drucker first used the terms 'knowledge worker' and 'knowledge society' in the 1960s and more recently stated that knowledge has become the only meaningful resource.

solving skills are used as a vehicle for bringing about behaviour changes". A complementary question is often in many articles: Could a new sociality emerge by using the technique? to answer this question two positions exist: the first one is advocated by Ngwenyama, and Lyytinen (1997) in particular, which considers that this emerging sociality based on better visibility, commitment and autonomy additional action may be able to create a mutual respect and a new solidarity between actors separated by distances, barriers and cultural and hierarchical working procedures. Other authors as Comtet, (2000); D'Iribarne, Lemoncini, Tchobanian (1999) have a point of view quite the Opposite: organizations must reform themselves before introducing a tool.

We'll be attentive during our diagnosis to the choice made between reforming the existing structure before introducing tool and using the technique to induce change and stimulate new sociality

According to Muhlmann (2001) collaborative technology is headed by interaction between actors. The primacy of actors takes its full dimension when the project management regulation of the organization by the technique leaves room for their inventiveness (Cardon and Licoppe, 1997). If the technique may be appropriate by the players, then an inventive mechanism where creativity encourages friendly exchanges and thereby promotes greater efficiency can emerge**.** Within a favourable social climate, a human network, preferably non-hierarchical, such as those recommended for environmental scanning devices, should allow the involvement of players which is of particular importance within a framework of interpersonal and informal cross-communication.

We'll be attentive during our diagnosis to signs of inventiveness, creativity and friendly exchange within the network.

Evolving from creativity, as an individual process to innovation as a collective one is largely conditioned by the balance between the need to insure order and the need to promote innovation through creativity. Eisenberg and Goodall Jr (2003) think that communication allows bringing interpretations of the context, to wonder about the creative resources and the process of interaction and to propose rules of exchange allowing ensuring balance between creativity and constraints. But, this type of open and highly interdependent systems can reach their limits when confronted with the differences in organizational cultures and the divergence of interests between the actors.

2.2 Potential obstacles related to culture

As element of the context, *"an organization culture is the set of basic assumptions developed by organization as it learns to cope with its problems of external adaptation or internal integration (..) The assumptions form guides to behaviour as they become reflected in the organizational norms or information sharing, preferred communication style and attitudes towards the surfacing and testing of assumptions*" (Gibbons and Prescott, 1996). Eisenberg and. Goodall (2003), consider that the creative potential of an organization is not isolated from the institutional (ie cultural) constraints which are intended to maintain order. Osborn (1957), cited three categories of obstacles to the creativity: (1) preconceived ideas (customs, rigidity); (2) auto-discouragement (lack of self-confidence);(3) tendency to conformism (conventional behaviour). Wolf Morrison and Millikens (2000) used the concept of organizational silence to describe the potentially dangerous impediment to organizational change development which can generate what they call "climate of silence": "widely shared perceptions among employees that speaking up about problems or issues is futile and/or dangerous". According to the authors, one important factor that they believe facilitate the creation of climate of silence in organization is top manager's fear of receiving feedback especially from subordinates. In this discussion of organizational learning, Argyris (1977) highlights that the "theories-in use" that guide managers' actions differs, often in significant way from their espoused theory or what they think derives their behaviour".

We'll be attentive during our diagnosis to signs of rigidity, lack of self confidence and the tendency to conformism from subordinates and to the potential contradictory discourse of the managers.

Goss and al. (1993), Kotter and Heskett, (1992) consider that the first cause of failure of organisational change is failure in cultural change. Schein (1985) for example, says that information technology, as occasion of change, will be rejected if it is inhibited by values different from those highlighted in the organization. Many empirical studies in the field of CSCW outlined the crucial role of the technology introduced to democratize the communication process by increasing the equality of participation among the members of the group and by decreasing the domination of the group by a few number (Pinsonneault and Kraemer, 1989; Mcleod, 1992). But Z'ghal (2003) isn't sure that the direction wants employees voicing and accepts to see its power weakened. According to Zghal (1994), in developing countries (Tunisia for example), dominated by a high degree of flexibility (lack of transparency and accountability), there is, a fuzzy, which seems to have an inhibiting effect on the success of the new technology introduced. New technology is often perceived as a way of controlling the uncertainty generated by the fear of not mastering the technology and the new ways of working. This atmosphere of increased uncertainty (ignorance and lack of information) could generate certain intolerance to ambiguity in the form of resistance and rigid attitudes (technical determinism, and excessive rationality).

We'll be attentive during our diagnosis to signs of resistance, rigid attitude, intolerance to ambiguity and fear of not mastering and not assimilating the new way of doing.

The table below contains a preliminary version of or diagnosis repository:

Table 1: Diagnosis repository for a better articulation between creativity and innovation

Indicators	Failure factors	Potential risks	Questions to ask
The kind of structure proposed	Task forces and ad hoc groups with high degree of flexibility and low degree of control doesn't challenge the existing classic structures	The learning process of sensemaking and knowledge creating can't start	Did the specifications take in account this aspect? Should they impose the creation of a project team entirely dedicated to the tasks to which they are assigned within the project?
Technique is used to induce change within the existing structure	The existing structure is bureaucratic and pyramidal which could justify their inaction, partitioning and their rigid functional mode toward their environment.	There is no systematic emergence of new forms of social organization.	Did the contextual conditions have been considered? Did the sensibilization program communicate about the potential consequences of implementing the new system within a bureaucratic structure?
Participants are inventive	Non hierarchical structures are powerless within a bureaucratic system	Low involvement of players without decision power and no sign of inventiveness	Did the players were designed by their chiefs or selected by the consultant? Did the working group integrate chief executives and professionals?
A tendency to conformism is observed	Conventional behaviour	Climate of silence	Did the consultant team try to bring interpretations of the context, to wonder about the creative resources and the process of interaction and to propose rules of exchange allowing ensuring balance between creativity and constraints?

Auto-discouragement	Lack of self confidence	fear of not mastering and not assimilating the new way of doing	Did the consultant team prepare a psychological program action to anticipate potential fear and lack of confidence?
Rigid attitudes are frequent	Intolerance to ambiguity is high increased uncertainty (ignorance and lack of information)	Technical determinism excessive rationality and rejection of the CSCW solution	Did the consultant team try to know how technology is perceived by participants?
Contradictory discourse of the managers.	A "theories-in use" that guides managers' actions which differs, from their espoused theory or what they think derives their behaviour".	A fuzzy, which seems to have an inhibiting effect on the success of the new technology introduced.	Did the consulting adapt their methodology to the emerging contextual conditions or do they continue their plan?

3. THE RESEARCH PROJECT

In a Tunisian agriculture context, an Integrated Environmental Scanning CSCW System was introduced in order to:

- Promote the competitiveness of the Tunisian agricultural products;
- Develop the anticipation capacity of the stakeholders within the agriculture field;
- Identify the potential needs of the national market consumers;
- Identify the technology innovations and the potential behaviour of the economic, politic and social actors.

The implementation process was divided into several phases. It began with a sensibilization/learning phase which aims to:

- Clarify the concepts related to the scanning activities
- Make participants aware of the crucial role of human resource intelligence to reduce uncertainty and ambiguity of environmental information.
- Structure the creative innovative process
- Bring new ways of doing

During this first phase, both the observatory managers, a team of 5 persons, and 10 members from the 5 interprofessional groups associated to the project were concerned with the learning process initiated during the different meetings. The summary below describes the methodology used during the first phase to achieve the users' expectations as expressed in the specifications; the approach seems to obey to a plan and to ignore the contextual conditions.

Tables 2: Summary of the sensibilization /learning phase

Objective : **Give answers to 3 questions**	1. What is important? : Clarification of the general objectives of the ESS scope and definition of priority watch. 2. Who pilots? : Appointment of persons who are responsible for both jointly and collectively to the success of the device 3. How to ensure the rise? : Identification of scenarios and choices

Methods implemented	Technical Working Group; Metaplan (or Creativity technique) ; methods of quality procedures and methods to assist decision-making supported by aid software (DSS) and visual (diagrams); concepts and principles of strategic analysis and Marketing adapted to the definition of the objectives of surveillance; rules definition and formulation factual goals (nature, extent possible, ensuring consistency of the cascade of objectives set).
Conduct of meetings	• Each session is preceded by a collective face-to- face validation of the results of the previous meeting (previously sent for analysis) • The whole work is made with computer-assisted presentation • **Skype videoconference** is used to facilitate interactions between the device members. This free type of groupware is proposed to trigger a learning process and facilitate the appropriation of the technology
Outputs of the first phase	• A report of: • Description of scenarios, method of selection and established priority: definition of the pilot project • Steering the device: responsibilities clearly and formally clarified Information and communication Infrastructure: a summary of the strengths and weaknesses in relation to the needs of software Watch tools and e-collaboration portal integrating EDM, project management, RSS,[4] wikis spaces etc..... • Content of the training needed
Benefits of the first sequence	• The clarification of goals allows to involve the leadership and "give meaning" to the process (working on a result to be achieved), it is also a prerequisite for mobilizing leadership change • Increase of managerial skills by appropriating ranking methods, to define priorities for action. • Learning and/or amplification (synergy…) of effective teamwork (consistency, cohesion) because structured (clear objectives, concrete results after every meeting). The integration of various officials concerned facilitates their accession to the project, its goals and its methods. • Step by step a roach: This way to introduce progressive change facilitates ownership progressive methods, updating goals, improved procedures while allowing consideration of the surrounding culture (values and routines) without harming obtaining quick results. • Steering system, establish and define responsibilities

CONCLUSION

Our contribution in this article consisted in defining the conceptual framework of the ES CSCW project and proposing a diagnosis repository that could (1) assist consultants in the field of SI, (2) avoid the abortion of the implementing process of the new system, (3) provide solutions for overcoming both organizational and structural emerging obstacles and (4) ensure a better link between creativity and innovation. This tool could be used by us or by other researchers in the field of information system in an experimental way to bring new actionable knowledge for practitioners mainly consultant teams. Differences between the contexts of interventions could help to design a specific repository for each context. The results of our diagnosis of the a roach followed by the consultant team in the implementation of the ES CSCW within the Tunisian administration context will be an occasion for us to observe the emergence of specific contextual conditions not encountered by authors who worked in other contexts and to elaborate recommendations to ensure better

[4] RSS (Really Simple Syndication) is an XML-based format for sharing and distributing Web content

articulation between creativity and innovation and facilitate the appropriation of the technology by the actors. Integration of the organizational and structural dimensions of the ES CSCW within the specifications' document is a critical success factor for the process implementation.

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